



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/647,669	08/25/2003	Fujio Akahane	Q77136	2142

23373 7590 05/18/2005

SUGHRUE MION, PLLC  
2100 PENNSYLVANIA AVENUE, N.W.  
SUITE 800  
WASHINGTON, DC 20037

EXAMINER

MRUK, GEOFFREY S

ART UNIT PAPER NUMBER

2853

DATE MAILED: 05/18/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/647,669

Applicant(s)

AKAHANE ET AL.

Examiner

Geoffrey Mruk

Art Unit

2853

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 19 April 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) 11 and 12 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2 and 10 is/are rejected.
- 7) ☒ Claim(s) 3-9 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 February 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 2/17/04, 5/5/05.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Election/Restrictions*

Claims 11 and 12 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 19 April 2005.

### *Drawings*

The drawings are objected to because drawing 12A fails to show a reference point and direction for the "fixed pitch" located on the first face of the chamber formation plate. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner,

the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Claim Objections***

Claim 1 is objected to because of the following informalities: The frame of reference is unclear in the phrase "a plurality of recesses arranged in a first direction at a fixed pitch".

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shingai et al. (US 6,719,410 B2) in view of Morse (US 3,895,942).

With respect to claim 1, the primary reference of Shingai discloses a liquid ejection head (Column 3, lines 27-33), comprising:

- a chamber formation plate (Fig. 9, element 60), having a first face formed with a plurality of recesses (Fig. 9, element 6) arranged in a first direction at a fixed

Art Unit: 2853

pitch, such that each of the recesses is communicated with, via a through hole (Fig. 9, element 4),

- a second face which is an opposite face of the first face, the chamber formation plate comprised of nickel (Column 11, lines 36-39);
- a sealing plate (fig. 9, element 2), joined to the first face of the chamber formation plate so as to seal the recesses to form a plurality of pressure generating chambers; and
- a metallic nozzle plate (Fig. 15B element 118), formed with a plurality of nozzles (Fig. 15B, element 120), and joined to the second face of the chamber formation plate such that each of the nozzles is communicated with associated one of the pressure generating chamber via the through hole (Fig. 9, element 9); and
- the thickness of a partition wall (Fig. 4C, element 6) was made to be  $6.83\mu\text{m}$  (Column 11, line 36)
- wherein the fixed pitch is 0.3 mm or less (Column 10, lines 63-64).

However, the primary reference of Shingai fails to disclose a ratio of a grain size of a crystal of the nickel with respect to a thickness of a partition wall defined between each adjacent ones of the recesses is 60% or less.

The secondary reference of Morse discloses a strong, high purity nickel having an average grain size of about 7 microns or less (Column 1, lines 61-65).

At the time of the invention, it would have been obvious to one of ordinary skill in the art to combine the nickel disclose by Morse in the ink jet head of Shingai. The motivation for doing so would have been "a nickel product of high purity

characterized by improved strength at room temperature and at elevated temperatures, by resistance to grain coarsening upon heating to high temperatures, which is weldable, and a high purity nickel product which in the form of sheet or strip does not exhibit Luders lines or bands" (Column 1, lines 53-61).

2. Claims 2 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shingai et al. (US 6,719,410 B2) in view of Morse (US 3,895,942) as applied to claim 1 above, and further in view of Miyata et al. (US 5,754,205).

Shingai and Morse references disclose all of the limitations of the liquid ejection head, including the grain size is no less than 5 $\mu$ m and less than 25 $\mu$ m (Column 1, lines 61-65), except the thickness of the partition wall falls within a range of 20 $\mu$ m to 50 $\mu$ m.

Miyata discloses the thickness of the partition wall falls within a range of 20 $\mu$ m to 50 $\mu$ m (Column 10, lines 15-36).

Therefore, in view of the teachings of the tertiary reference, one of ordinary skill in the art would have been motivated to modify the primary reference by using the partition wall thickness of Miyata in the ink jet head of Shingai, since it has been held that it is not inventive to discovering an optimum value or workable ranges by routine experimentation. *In re Aller*, 105 USPQ 233 (CCPA1955).

#### ***Allowable Subject Matter***

Claims 4-9 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

With respect to claim 4, a Vickers hardness of the nickel is no less than 150 Hv and less than 190 Hv.

With respect to claim 5, a ductility of the nickel is greater than 5% and less than 20%.

With respect to claim 6, a ratio of a height of the partition wall with respect to the thickness of the partition wall falls within a range of 1.0 to 2.1.

With respect to claim 7, a ratio of a width of each of the recesses with respect to the thickness of the partition wall falls within a range of 2.0 to 5.0.

With respect to claim 8, a ratio of a depth of each of the recesses with respect to the thickness of the partition wall falls within a range of 2.0 to 4.5.

With respect to claim 9, a bottom of each of the recesses has a V-shaped cross section when viewed from a second direction perpendicular to the first direction; and an angle between faces forming the V-shaped cross section falls within a range of 45 degrees to 110 degrees.

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Randall et al. (US 3,523,224) discloses a nickel oxide where " it has further been determined that the optimum average crystalline grain size should be from 30 to 60 microns. This crystalline grain size is considerably larger than that found

Art Unit: 2853

in nickel having a hardness falling below 150 on the Vickers hardness scale. When nickel has all of the desirable characteristics indicated, an oxidized specimen will reveal substantially no inter-granular or intercrystalline oxidation" (Column 2, lines 36-44). Randall fails to provide motivation for using nickel having a hardness of 150 on the Vickers hardness scale.

Brooks et al. (US 4,430,784) discloses, "The initial process step in the preparation of a multi-orifice nozzle is, of course, the grooving of the plate member" (Column 6, lines 19-21; Fig. 10). Brooks fails to teach a chamber formation plate where the bottom of each recess has a V-shaped cross section.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Geoffrey Mruk whose telephone number is (571) 272-2810. The examiner can normally be reached on 7am - 330pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Meier can be reached on (571) 272-2149. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.




Art Unit: 2853

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

GSM  
5/11/2005

GM

  
5/13/05  
MANISH S. SHAH  
PRIMARY EXAMINER